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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/492,246	01/27/2000	Anna Lee Y. Tonkovich	E-1666B CIP	9623

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EXAMINER	
STRICKLAND, JONAS N	
ART UNIT	PAPER NUMBER
1754	13

DATE MAILED: 06/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

HGT

Office Action Summary	Application No.	Applicant(s)	
	09/492,246	TONKOVICH ET AL.	
	Examiner	Art Unit	
	Jonas N Strickland	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 April 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-9 and 11-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-9,11-13,18-23,25,26,36,38-44 and 46* is/are rejected.

7)☒ Claim(s) *14-17,24,27-35,37 and 45* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *9 and 10* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. This Office Action is response to the Information disclosure statement files on 2/13/02 and 4/08/02, as well as the amendment filed on 4/11/02. Claims 1, 7, and 11 have been amended. Claims 2-4 and 10 have been cancelled. Claims 13-46 have been newly added to the instant application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

3. Claim 6 is rejected under 35 U.S.C. 102(a) as being anticipated by Subramaniam et al. (US Patent 5,725,756).

Subramaniam et al discloses a method to minimize catalyst deactivation rate and coke laydown, and maximize desired reaction rate in processing of industrially significant reactions under supercritical conditions to generate a reaction mixture stream including formed reaction products and reactants. The reaction mixture has a fluid density of greater than 0.65 gm/cc (abstract). This method reduces coke buildup in porous catalysts (col. 1, lines 8-11) and is industrially significant in alkylation reactions (col. 1, lines 13-16). Subramaniam et al continues to disclose that a volume of at least 0.65 g/cc maximizes the reaction rates and minimizes deactivation rates and coke

laydown rates associated with hydrocarbon contact with acid catalysts (col. 11, lines 16-20; or preferably greater than 0.5 g/cc; col. 11, lines 43-44). Subramaniam et al teaches a porous catalyst having a metal support (col. 23, lines 16-17). Subramaniam et al. continues to teach passing the reactor effluent through a heat exchanger (col. 20, lines 50-51).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 5, 7, 11, 12, 18-21, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramaniam et al. (US Patent 5,725,756) in view of Kestner (US Patent 3,145,238) and Baden et al. (US Patent 4,985,230).

Subramaniam et al discloses a method to minimize catalyst deactivation rate and coke laydown, and maximize desired reaction rate in processing of industrially significant reactions under supercritical conditions to generate a reaction mixture stream including formed reaction products and reactants. The reaction mixture has fluid density of greater than 0.65 gm/cc (abstract). This method reduces coke buildup in porous catalysts (col. 1, lines 8-11) and is industrially significant in alkylation reactions (col. 1, lines 13-16). Subramaniam et al continues to disclose that a volume of at least 0.65 g/cc maximizes the reaction rates and minimizes deactivation rates and coke

laydown rates associated with hydrocarbon contact with acid catalysts (col. 11, lines 16-20; or preferably greater than 0.5 g/cc; col. 11, lines 43-44). With respect to claim 7, Subramaniam et al teaches having a porous catalyst having a metal support (col. 23, lines 16-17). Subramaniam et al. continues to teach passing the reactor effluent through a heat exchanger (col. 20, lines 50-51). However, Subramaniam et al. does not disclose wherein the reactant contacts the catalyst in less than about 0.3 seconds and wherein a pressure drop through the reaction chamber is less than about 15 psig.

Kestner teaches a catalytic conversion process, wherein the reactant contacts the catalyst for a residence time of 0.1 to 0.4 seconds and wherein the reaction chamber experiences a pressure of 1 to 10 psig (col. 2, lines 55-61).

Baden et al. teaches a method of carrying out heterogeneous catalytic chemical processes, wherein a low-pressure drop represents the desired process conditions. Baden also teaches wherein a low-pressure drop will reduce the power required by the process plant irrespective of the type of catalytic process (col. 2, lines 9-13).

Therefore, it would have been obvious to one of ordinary skill in the art, to modify the catalytic conversion method taught by Subramaniam et al, based on the teachings of Kestner et al. and Baden et al., because Kestner et al. teaches a catalytic conversion process, wherein the reactant contacts the catalyst at a residence time of less than 0.3 seconds and has a pressure within the range of 1 to 10 psig. Baden et al. teaches that a low-pressure drop will reduce the power required by the process plant irrespective of the type of catalytic process (col. 2, lines 9-13). Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill, would expect a

catalytic conversion process having a residence time in which the reactant contacts the catalyst at a time of less than 0.3 seconds and wherein the pressure is less than 15 psig as taught by Kestner, to be similarly useful and applicable to a catalytic conversion process, which desires to minimize catalyst deactivation rate and coke laydown, and maximize desired reaction rate in processing of industrially significant reactions under supercritical conditions to generate a reaction mixture stream including formed reaction products and reactants as taught by Subramaniam et al. Furthermore, Baden et al. teaches that regardless of the catalytic process, a low-pressure drop is essential to a catalytic reaction.

With respect to claims 18, 19 and 21, Subramaniam et al. discloses having a density greater than 0.65 g/cc (see abstract).

With respect to claim 20, Baden et al. teaches having channels.

6. Claims 8, 9, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramaniam et al. (US Patent 5,725,756) in view of Kestner (US Patent 3,145,238) and Baden et al. (US Patent 4,985,230) as applied to claims 1, 5, 7, 11, 12, 18-21, 25 and 26 above, and further in view of Eri et al. (WO 90/07377).

Applicant claims with respect to claim 8, 9, and 46 wherein the desirable reaction is the water-gas reaction and the desirable products are carbon dioxide and water and the undesirable product is methane. Applicant also claims wherein the desirable reaction is steam reforming of hydrocarbons and the undesirable product is coke.

The teachings of Subramaniam et al. and Kestner have been discussed. Subramaniam et al. teaches reducing coke from catalytic reactions and Kestner also

teaches reducing undesired byproducts from a catalytic conversion reaction (col. 1, lines 14-21). However, Subramaniam et al., Baden et al. and Kestner do not teach a water-gas shift reaction.

Eri teaches a water-gas shift reaction using catalysts, and producing an undesired side reaction of methane (p. 12, line 36 – p.13, line 26).

Therefore, it would have been obvious to one of ordinary skill in the art to be able to reduce the side reaction of methane based on the teachings of Eri, because Subramaniam et al. teaches minimizing undesired reaction products in catalytic reactions and Kestner and Baden et al. teach wherein a low pressure drop of a catalytic reactor reduces the formation of undesired reactions, irrespective of the type of catalytic process. Therefore, one would expect that it would be advantageous to employ the combination of Subramaniam et al., Baden et al. and Kestner with the teachings of Eri, in order to reduce the side reaction of methane in a water-gas shift reaction.

7. Claims 13, 22, 23, 36, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramaniam et al. (US Patent 5,725,756) in view of Kestner (US Patent 3,145,238) and Baden et al. (US Patent 4,985,230) as applied to claims 1, 5, 7, 11, 12, 18-21, 25 and 26 above, and further in view of Soonawala et al. (US Patent 4,065,379).

The teachings of Subramaniam et al., Baden et al. and Kestner have been discussed with respect to claims 1, 5, 7, 11, 12, 18-21, 25, and 26. However, Subramaniam et al., Baden et al. and Kestner are silent with respect to the limitations of claims 13, 22, 23, 36, and 44.

However, Soonawala et al. teaches a catalytic process for the production of olefins, wherein the catalytic hydrotreatment may be carried out in a single-stage operation or in multiple stages using the same or different catalysts, with respect to claim 13. With respect to claims 22, 23, 36, and 44, Soonawala et al. teaches catalytic reaction conditions having residence times between 0.04 and 1.0 sec. (col. 3, lines 65-68).

Therefore, it would have been obvious to one of ordinary skill in the art based on the teachings of Soonawala et al. to carryout a catalytic treatment wherein the contact time is less than 0.05 seconds, because Soonawala et al. teaches a catalytic treatment at a contact time between 0.04 and 1.0 sec. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the product of one reaction chamber to be fed to another reaction chamber containing a different catalyst, because Soonawala et al. teaches wherein the catalytic hydrotreatment may be carried out in a single-stage operation or in multiple stages using the same or different catalysts. Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art would expect a catalytic process wherein an undesirable byproduct is suppressed as taught by Soonawala et al. to be similarly useful and applicable to the catalytic processes wherein undesirable byproducts are suppressed as disclosed by Subramaniam et al., Baden et al. and Kestner.

8. Claims 38-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramaniam et al. (US Patent 5,725,756) in view of Kestner (US Patent 3,145,238)

and Baden et al. (US Patent 4,985,230) as applied to claims 1, 5, 7, 11, 12, 18-21, 25 and 26 above, and further in view of Pestryakov et al. (React. Kinet. Catalysis).

The teachings of Subramaniam et al., Baden et al. and Kestner have been discussed with respect to claims 1, 5, 7, 11, 12, 18-21, 25 and 26, but these references are silent with respect to claims 38-44, which require an interfacial layer on a porous support.

Pestryakov et al. teaches an interfacial layer of alumina being applied as an intermediate layer on foam metal or foam ceramics (porous supports) for deep catalytic oxidation reactions (see Experimental section). It would have been obvious for the thermal coefficient of expansion to be different between the porous support and the interfacial layer as taught by Pestryakov et al., because the alumina and foam supports are different materials.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the teachings of Subramaniam et al., Baden et al. and Kestner, by using a catalyst comprised of an interfacial layer on a porous support, based on the teachings of Pestryakov et al., because Pestryakov et al. teaches a catalytic process wherein undesirable byproducts are removed having a catalyst with an interfacial layer applied on a porous support. Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill would expect a process, in which undesirable byproducts are removed as taught by Pestryakov et al. to be similarly useful and applicable to processes for suppressing undesirable byproducts as taught by Subramaniam et al., Baden et al. and Kestner.

Allowable Subject Matter

9. Claims 14-17, 24, 27-35, 37, and 45 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: The instantly claimed invention overcomes the teachings of the prior art with respect to claims 14-17, 24, 27-35, 37, and 45 by having a an interfacial layer on a porous support, wherein deep oxidation reactions are excluded. Pestryakov et al. teaches an interfacial layer on a porous support, but the catalyst is directed toward deep oxidation reactions of hydrocarbons. Furthermore, the prior art does not disclose a contact time of less than 0.01 seconds.

Response to Arguments

11. Applicant's arguments with respect to claims 1, 5-9, and 11-46 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonas N Strickland whose telephone number is 703-306-5692. The examiner can normally be reached on M-TH. 7:30-5:00, off 1st Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0661.

Jonas N. Strickland
June 25, 2002

Wayne A. Langel
Primary Examiner
GAU 1754